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USI



The United States of America



The Commissioner of Patents and Trademarks

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person or persons having title to this patent the right to exclude others from making, using or selling the invention throughout the United States of America for the term of seventeen years from the date of this patent, subject to the payment of maintenance fees as provided by law.

Bruce Lehman

Commissioner of Patents and Trademarks

Assilla Hull

Attest

NOTICE

If the application for this patent was filed on or after December 12, 1980, maintenance fees are due three years and six months, seven years and six months, and eleven years and six months after the date of this grant, or within a grace period of six months thereafter upon payment of a surcharge as provided by law. The amount, number, and timing of the maintenance fees required may be changed by law or regulation. Unless payment of the applicable maintenance fee is received in the Patent and Trademark Office on or before the date the fee is due or within a grace period of six months thereafter, the patent will expire as of the end of such grace period.



US005510982A

United States Patent [19]
Ohnishi et al.

[11] **Patent Number:** **5,510,982**
[45] **Date of Patent:** **Apr. 23, 1996**

[54] **AUTOMATIC AUTOMOBILE
TRANSMISSION WITH VARIABLE SHIFT
PATTERN CONTROLLED IN RESPONSE TO
ESTIMATED RUNNING LOAD**

[75] Inventors: Hiroshi Ohnishi, Katsuta; Kouji Kitano, Kagawa; Mitsuo Kayano, Hitachi; Nobuo Kurihara, Hitachioti, all of Japan

[73] Assignee: Hitachi, Ltd., Japan

[21] Appl. No.: 985,199

[22] Filed: Dec. 3, 1992

[30] **Foreign Application Priority Data**

Dec. 3, 1991 [JP] Japan 3-319205

[51] Int. Cl. 6 B60K 17/06

[52] U.S. Cl. 364/424.1; 477/120; 477/900;
395/905

[58] **Field of Search** 364/424.1; 395/903,
395/905, 21, 23; 477/115, 120, 131, 138,
154, 155, 97, 900, 904

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[57] **ABSTRACT**

An automatic transmission control system for an automobile, comprising a vehicle weight estimation unit which estimates a vehicle weight of the automobile a torque estimation unit which estimates an output torque, an acceleration input unit which accepts an acceleration signal; a load estimation unit (110) which estimates a running load from the estimated vehicle weight, the estimated output torque and the accepted acceleration; a memory which stores a plurality of shift schedules therein; and a gear position determination unit (109) which includes the memory, and which selects one of the shift schedules in accordance with the vehicle weight and the estimated running load, so as to determine a gear position of an automatic transmission of the automobile in conformity with the selected shift schedule. An exact shift operation conformed to the vehicle weight and the running load can be performed, and an enhanced fuel consumption can be attained.

7 Claims, 20 Drawing Sheets

